

# Vibhu Tummallapalli

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## EDUCATION

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### University of North Carolina at Charlotte

Master of Science in Cybersecurity

Charlotte, NC

Aug 2026 - May 2028 (Expected)

- Concentration: Network Security; Relevant Coursework: Network Security, Wireless Network Security, Information Infrastructure Protection, Computer Communications and Networks, Competitive Cyber Defense, Malware Analysis

### East Carolina University

Bachelor of Science in Software Engineering

Greenville, NC

May 2026

- Concentration: Data Science; Relevant Coursework: Artificial Intelligence, Big Data Analytics, NLP, Computer Vision

## SKILLS

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**Languages:** Python, C#, Java, JavaScript, Rust, SQL

**AI / ML:** LLM application development, multi-agent systems (CrewAI, LangChain), structured prompt engineering, Anthropic Claude API & Claude Code, GPT-4o & OpenAI Vision, Ollama, PyTorch

**Frameworks & Web:** .NET 8, ASP.NET Core, Entity Framework Core, WPF, React, Next.js, Vite, SignalR, JWT

**Cloud & Tools:** GCP (App Engine, Cloud Run, Pub/Sub), GitHub Actions, GitLab CI, PostgreSQL, Wireshark, Bash, PowerShell

## WORK EXPERIENCE

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### ECU College of Engineering and Technology

Undergraduate Research Assistant

Greenville, NC

Jun 2025 - May 2026

- Contributed to 3 faculty research projects in health tech and cybersecurity, owning prototype implementation from design through validation.
- Built data ingestion prototypes in Python, C#, and Java that processed external datasets into clean, structured outputs, informed by literature reviews and performance trade-off analyses.
- Maintained research environments (Python venvs, Maven, local LLM integrations) and managed Git repositories supporting reproducibility across team members.

### Thomas Harriot College of Arts & Sciences

Learning Assistant

Greenville, NC

Jan 2023 - Jan 2026

- Tutored 50+ students in Algebra, Calculus, and Statistics through weekly review sessions and office hours, raising failing test scores to 80%+ and helping 75% of students achieve a 4.0 in the course.
- Supported professors during class by managing materials, taking attendance, and assisting with demonstrations, while reinforcing coursework one-on-one and in groups to improve student comprehension.

## PROJECT EXPERIENCE

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### NC Early Mathematics Placement Testing

Online Testing System (Senior Capstone)

Greenville, NC

Aug 2025 - May 2026

- Built a full-stack web platform (React 19/Vite, .NET 8, EF Core, PostgreSQL) used by 60 NC high schools and 5,000+ students, with a version-controlled question bank, automated grading, and session-based access control.
- Implemented role-based access (Admin/Coordinator/Proctor/Student) with JWT and 2FA, plus real-time SignalR proctor monitoring with live tracking and pause/resume controls.
- Architected an asynchronous email pipeline via GCP Pub/Sub and a Python Cloud Function; deployed to GCP (App Engine, Cloud Run) through GitHub Actions CI/CD as part of a 5-member Agile team using GitLab.

### ECU College of Engineering and Technology

Metamorphic Testing of Multi-Agent AI Systems (Research)

Greenville, NC

Apr 2026

- Designed a novel catalog of 9 metamorphic relations to test multi-agent LLM systems where traditional test oracles fail (interchangeability, redundancy invariance, graceful degradation, etc.).
- Built a reusable Python framework with multi-dimensional semantic verifiers (token overlap, difflib similarity, length ratios) to address the test oracle problem for LLM outputs.
- Implemented CrewAI test harnesses against domain tasks (financial risk, healthcare cloud security, SaaS market research), executing experiments across OpenAI and Ollama backends via LangChain to generate equivalence rates and violation reports.

### ECU College of Engineering and Technology

Dental Charting Tool

Greenville, NC

Jun 2025 - Jan 2026

- Built a WPF (.NET)/C# desktop app for the ECU School of Dental Medicine integrating GPT-4o Vision for radiographic analysis, FDI tooth-numbering charting, CDT-coded procedure cataloging, and urgency-based appointment scheduling.
- Engineered a 5-step prompt pipeline (observation, chart cross-reference, medical alerts, CDT recommendations, urgency triage) for clinically contextualized output; presented at ECU RCAW and CORAS 2026.